AQUA EXCEL 2020

AQUAculture infrastructures for EXCELlence in European fish research towards 2020

Project News

ISSUE 5 SEPTEMBER 2018

AQUAEXCEL^{2020} is a €9.7 million European Union-funded Horizon 2020 research infrastructure project that aims to support the sustainable growth of the aquaculture sector in Europe. It does so by integration of the European aquaculture community, and providing it with crucial tools, facilities, and novel services to conduct advanced fish research.

IN THIS ISSUE:

AQUA EXCEL 2020

ISSUE 5
PROJECT NEWS
WWW.AQUAEXCEL2020.EU

Introduction from the Coordinator

AQUAEXCEL²⁰²⁰: An essential component of the EU aquaculture landscape

We are now starting the third year of implementation of the project, which means we still have two more years to go. We see the results of the project materializing, with important successes in our "research for better experiments", such as new equipment being designed to estimate biomass in cages, implantable sensor tags and user-friendly models to simulate aquaculture experiments.

We are also proud to contribute to the advancement of EU aquaculture research through our Transnational Access program, which has funded 78 research projects to date. There are still plenty of opportunities for funding, so if you have a project idea in aquaculture research, we would be delighted to welcome you in one of our 39 research infrastructures open for access. The application procedure is quick and easy, and the chances of getting funded high (≈60 %). Don't let this opportunity go, **AQUAEXCEL²⁰²⁰** may not be here forever (although we hope for a continuation!).

Next year will also be a great year for those willing to learn from the work done in **AQUAEXCEL²⁰²⁰** to accelerate aquaculture research and provide new insights in areas like experimental design in aquaculture, genomics and nutrition. No less than seven courses will be given in 2019, two of them online, the rest face-to-face. This is a unique opportunity for young researchers to meet the best experts in their field.

Fish is a key component of a healthy (and delicious!) diet, and we are convinced that Europe still underuses its capacity to produce top quality fish in secure, controlled and environmentally-friendly conditions. As scientists and practitioners in aquaculture, we know how well European fish are farmed. We need to spread this word to the wider public – all of us can contribute to conveying this knowledge to avoid negative preconceptions, which are still unfortunately too prevalent. At the hugely successful AQUA2018 conference in Montpellier this August, more than 3000 participants said "We R Aquaculture"! We have every reason to be enthusiastic - make it known!

Project News and Highlights

Non-invasive accurate method for fish size estimation

D. Voskakis[1,2], A. Makris[3], M. Sfakiotakis[2,3], V. Chalkiadakis[1], N. Papandroulakis[1]

[1]HCMR, [2]TEI Crete, [3]FORTH

To effectively manage aquaculture farms, reliable estimates of fish growth during the rearing stage are required. Currently, the most commonly used techniques for length measurement are based on sampling of specimens on-site, which requires experienced personnel and induces stress in fish. There are some non-invasive methods, for example the framing method in the salmon industry, but these lack accuracy and are not extensively used. There is a growing demand from industry and researchers for accurate measurement of fish size in a manner that is less labor-intensive and offers improved precision compared to current approaches.

To address this problem, researchers from the Hellenic Centre for Marine Research (HCMR) in Greece, an **AQUAEXCEL²⁰²⁰** project partner, are involved in innovative research to develop a toolset which provides accurate length measurements of fish. Combining high definition (HD) stereoscopic images, free-to-use software (VidSync) and 3D calibration, the team have developed a technique for performing the task using non-invasive methods, and have trialled it for size estimation of European seabass and gilthead seabream.

The toolset is inspired by human vision, whereby stereoscopic vision systems employ a pair of cameras to enable the estimation of depth (i.e. the distance of the object of interest) in the observed area, by appropriate processing of two overlapping images of the same scene (slightly separated from each other). The resulting depth map allows accurate measurement of distances between points depicted in the image pair.

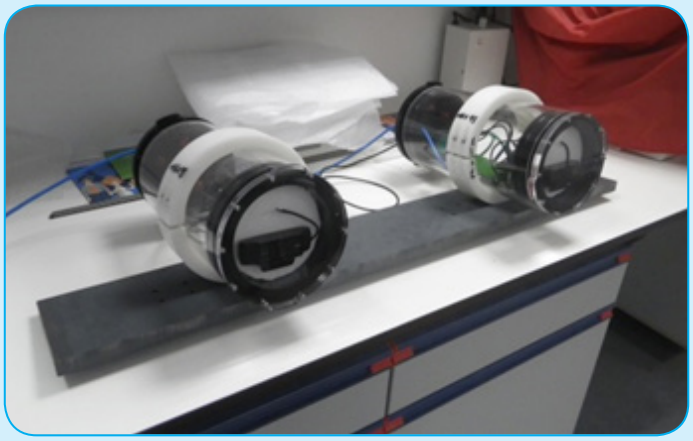


Figure 1. The stereoscopic camera used © HCMR

Project News and Highlights

The team have implemented one such stereoscopic vision system (Figure 1) using a set of two high definition web cameras, connected to a mini-computer board. The images are

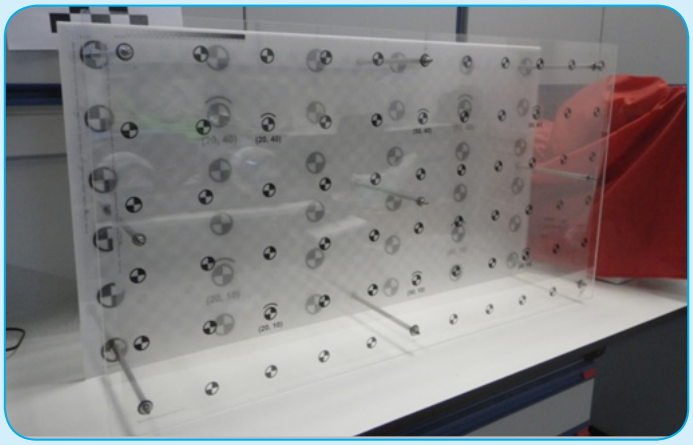


Figure 2. Calibration pattern © HCMR

then calibrated to achieve highly accurate results (Figure 2).

In one such experiment, actual length measurements were taken following recording of synchronised videos of a fish group in a tank. The use of VidSync software allowed length measurements (Figure 3) of manually selected individual fish (the points indicating the fish's head and tail are manually selected). The accuracy of the measurements of objects with known size was between 95% and 97%, depending on the object's angle with the cameras.

An automated system could be of interest for the aquaculture industry for effective feeding and fish stock management, and the team are currently working towards developing the toolset for such uses.

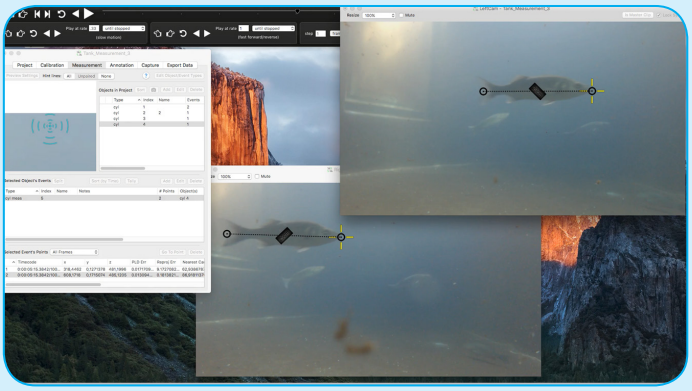


Figure 3. A screenshot of the VidSync software during the measurements © HCMR

AQUAEXCEL^{2020} Upcoming Events

AQUAEXCEL^{2020} Annual Meeting – Cartagena, Spain

The 2018 annual meeting of **AQUAEXCEL^{2020}** will take place in Cartagena (Spain) between 3-5 October 2018. **AQUAEXCEL^{2020}** project partners will meet to discuss the progress of the project to-date and agree on the organisation and coordination of the project over the coming 12 months.

The timing of the meeting marks an important milestone given that the project will be completed within two years of the meeting date. Additionally, the meeting offers partners an opportunity to discuss the project's impact at AQUA 2018, which took place in Montpellier, France last month.

More information on **AQUAEXCEL^{2020}** at AQUA 2018 coming in our next newsletter – stay tuned!

For regular updates on our upcoming events, follow us on Twitter

@aquaexcel2020

Cartagena, Spain © Alejandra Diego Eguren

Upcoming AQUAEXCEL^{2020} Training Courses

AQUAEXCEL^{2020} training courses aim to educate a new generation of aquaculture researchers and industry stakeholders to develop new knowledge, skills and tools to advance innovation and sustainability in aquaculture. In total, nine state-of-the-art online and face-to-face training courses are being offered between April 2016 and September 2020.

Course registration and attendance is **FREE** of charge, but participants are expected to cover their own travel and subsistence costs. All courses are open to anyone interested in the subjects offered. For an overview of all courses, further details and registration guidelines please visit the **AQUAEXCEL^{2020}** website: **www.aquaexcel2020.eu**. Registration for each course opens approximately three months in advance of the specified start date. Upcoming courses in 2019 are listed below:

ONLINE

TITLE: Using modelling of scale effects as a tool for experimental design
ORGANISERS: SINTEF Fiskeri og havbruk AS (SINTEF)
DATE: January 2019

TITLE: Training in the use of the Fish and Chips tool
ORGANISERS: Institut National de la Recherche Agronomique (INRA)
DATE: May 2019

TITLE: Experimental data management: from generating protocols to sharing data
ORGANISERS: University of South Bohemia in České Budějovice
DATE: Ongoing

FACE-TO-FACE

TITLE: Recirculating Aquaculture System (RAS)
ORGANISERS: Aquaculture and Fisheries group, Wageningen University (WU) and Ifremer
LOCATION: Wageningen, The Netherlands
DATE: May 2019

TITLE: Laboratory animal science for aquatic research facilities
ORGANISERS: Institute of Marine Research (IMR)
LOCATION: Bergen, Norway
DATE: June 2019

TITLE: Development and application of pipelines for NGS RADseq and RNAseq Protocols
ORGANISERS: University of Stirling (UoS)
LOCATION: Stirling, United Kingdom
DATE: September 2019

TITLE: Fish nutrition and feeding
ORGANISERS: INRA Nutrition, Métabolisme, Aquaculture (INRA-NuMeA)
LOCATION: Saint-Pée-sur-Nivelle, France
DATE: October 2019

TITLE: Planning and conducting experimental infection trials in fish
ORGANISERS: Danmarks Tekniske Universitet (DTU)
LOCATION: Denmark
DATE: November 2019

Transnational Access (TNA)

TNA Programme

A defining feature of **AQUAEXCEL²⁰²⁰** is its TNA programme, allowing external teams to access the partners' infrastructures via submission of research proposals, which are funded based on the evaluation of an independent selection panel. Access is offered to 39 unique research infrastructures of participating institutes, with experimental costs, travel and subsistence supported by **AQUAEXCEL²⁰²⁰**.

TNA – Calls for Access

AQUAEXCEL²⁰²⁰ calls for TNA are advertised on a regular basis. Applications are encouraged from European scientists who wish to avail of facilities available at any of the participating 39 aquaculture research infrastructures associated with the project. For more information, see: **www.aquaexcel2020.eu/transnational-access/call-access.**

Upcoming calls in 2018 – 2019:

Call no.	Activity	Date
12	opens	12 October 2018
	deadline	16 November 2018
13	opens	28 January 2019
	deadline	08 March 2019
14	opens	29 April 2019
	deadline	07 June 2019

TNA – Facilities under the Spotlight

TNA Facility: Institute of Marine Research (IMR), Norway
Location: Matredal, Norway
Website: www.imr.no
Contact: Ragnar Nortvedt
Email: ragnar.nortvedt@hi.no

The Institute of Marine Research (IMR) is the largest marine institute in Norway and covers marine living resources, marine environments and aquaculture. Its main aim is to provide advice to Norwegian authorities on aquaculture and ecosystems of the Barents Sea, the Norwegian Sea, the North Sea and the Norwegian coastal zone. IMR is a world-leading facility for assessing fish behaviour, welfare, growth and reproductive physiology. The research infrastructure is also excellent for aquaculture and climate-related studies. It provides both land-based and cage-based facilities at its facilities in Matredal.

The cage facilities consist of 12m² cages fully equipped with automatic computerised feeding and are specialised for behaviour and environmental studies. The facilities include video cameras, echo sounders and continuous logging of various parameters measuring fish health and behaviour. The overall aim of the cage facilities is improved management advice and development of farming protocols.

The land-based facilities at IMR Matre have tanks with automatic feeding, photoperiod, salinity (0-35 ppt), temperature (1-20°C all year round), O_2 and CO_2 control. Lab-based facilities allow for studies on fish welfare, growth, reproduction, and flesh quality. These allow for measurement of experimental parameters like diet, ration and photoperiod in salinities ranging from full freshwater to full salinity seawater and fish sizes from first feeding fry up to 2 kg. The tanks have waste feed collectors and some tanks have video cameras. The facility comprises 80 tanks, each 1 metre in diameter.

IMR Matre has access to cultured and wild stocks of salmonids like Atlantic salmon, rainbow trout and Atlantic cod. The facilities have been used for species varying from salmonids to halibut, cod, herring and horse mackerel, and have also been approved for a variety of other species such as hake and sea bream. **AQUAEXCEL²⁰²⁰** visitors will be invited to work in conjunction with one of IMR's eighteen research groups and, if appropriate, with existing research programs. Successful **AQUAEXCEL²⁰²⁰** TNA applicants will also be able to access support on experimental design and statistics, initiation of experiments, daily feeding programmes and husbandry and sampling.

Fish'n Co.

Fish profile

Atlantic cod (*Gadus morhua*) is a member of the Gadidae family and is one of the most important commercial fish species in Northern Europe. The species is broadly dispersed across the colder and deeper regions of the North Atlantic.

Atlantic cod farming dates back to the 1880s when Norwegian sea-captain G.M. Dannevig began experimenting with artificial rearing of cod. His objective was to increase coastal cod stocks by hatching and releasing yolk sac larvae of cod. Dannevig also produced some thousand juvenile cod, which were fed on natural zooplankton in seawater enclosures (natural rock basins, with or without connections to the sea but where seawater supply is controlled, and predators removed). The development of these experiments subsequently formed the basis for modern cod aquaculture.

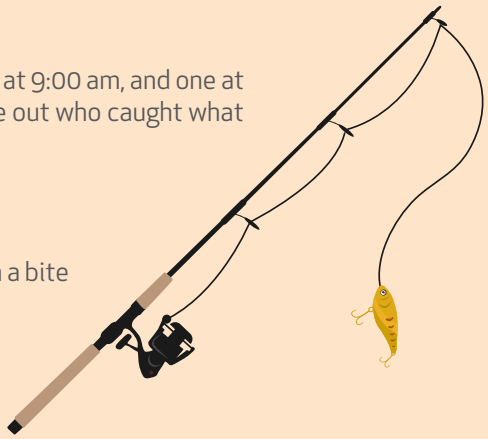
Image: Atlantic cod

Cod are carnivorous and consume a wide variety of species including bristle-worms, mussels, squid, crustaceans and fish including sand eel, Norwegian pout, capelin, sticklebacks, sprat and herring. Adult cod are cannibalistic and will often eat smaller cod where available. The diet of cod is believed to impact their skin colour: those that consume crustaceans often have a brownish-golden colour, while those that feed primarily on other fish are more greenish-blue in appearance.

Some cod stocks migrate extensively between feeding in the ocean and spawning along the coast, while other stocks are stationary throughout their life. Cod typically spawn between the months of January and April, with females releasing up to five million eggs. As a cold-water fish, the species favour temperatures of 2°C to 8°C but can tolerate temperatures as low as 0° and as high as 20°C during the winter and summer seasons. Check out the UN FAO website for more information: **http://www.fao.org/fishery/culturedspecies/search/en**.

Brain Teaser

Sam, Harry, and Alicia all went on a fishing trip. One fish was caught at 8:45am, one at 9:00 am, and one at 9:30 am. Three types of fish were caught: tuna, bass, and mackerel. Can you figure out who caught what fish and at what time?



Clues are as follows:

1. Sam didn't catch the mackerel
2. Harry fell asleep after Sam and Alicia caught their fish, only to be surprised with a bite
3. Alicia made fun of her comrade for catching a tiny tuna fish
4. Sam didn't get the first catch
5. Harry was proud of his fish, which wasn't a mackerel
6. The tuna was caught third

Send your answers to marieke@aquatt.ie.
The first correct answer we receive will feature in our next AQUAEXCEL2020 newsletter!

Re-cap: Fish Quiz Newsletter 4
Question: Two mothers and their two daughters go fishing together. They each catch one fish and place it in a box. They do not lose any fish but when they return home they only have three fish in the box. How is this?
Answer: There was the mother, her daughter, and her daughter's daughter. This equals 2 mothers and 2 daughters, totalling 3 fish!

Well done to Sarah-Louise Counter Selly, a post-doctoral research assistant examining aquaculture breeding stock and improvement in the University of Stirling, UK who was the first person to email the correct answer.

Satisfy your Tastebuds!

Tasty Recipe – Cod with lemon & parsley crust & summer greens

INGREDIENTS (serves 2)

1 thick slice stale bread, crusts removed

large bunch parsley

zest and juice from 1 lemon (unwaxed, organic if possible)

1 tbsp olive oil

2 cod fillets, about 175g/6oz each

260g pack tender-stem broccoli/asparagus or other seasonal greens

1 tsp wholegrain mustard

PREPARATION

1. Heat oven to 190°C/fan 170°C/gas 5. Tear the bread into pieces and place in a food processor with the parsley and lemon zest. Pulse to make coarse breadcrumbs.

2. Lightly oil a shallow baking dish, then add the cod in one layer. Lightly rub the fish with oil, then press on the crumbs. Bake for 10-12 mins. Meanwhile, steam the vegetables until tender, then coat in the remaining oil, mustard and lemon juice. Serve with the fish and a simple potato salad.

Recipe thanks to BBC Good Food: **https://bit.ly/2JgOBq4**

Marc's Wine Tip

Cod is a tasty but very lean fish, and with such an herbal crust, a powerful, fully dry white wine would match perfectly. Fiano di Avellino, produced from the local grape fiano on volcanic soils in Central Italy, has delicate white fruit, citrus, almond and herbal notes, and a long, vibrant, mineral finish. A must try!

AQUA EXCEL 2020

ISSUE 5
PROJECT NEWS
WWW.AQUAEXCEL2020.EU

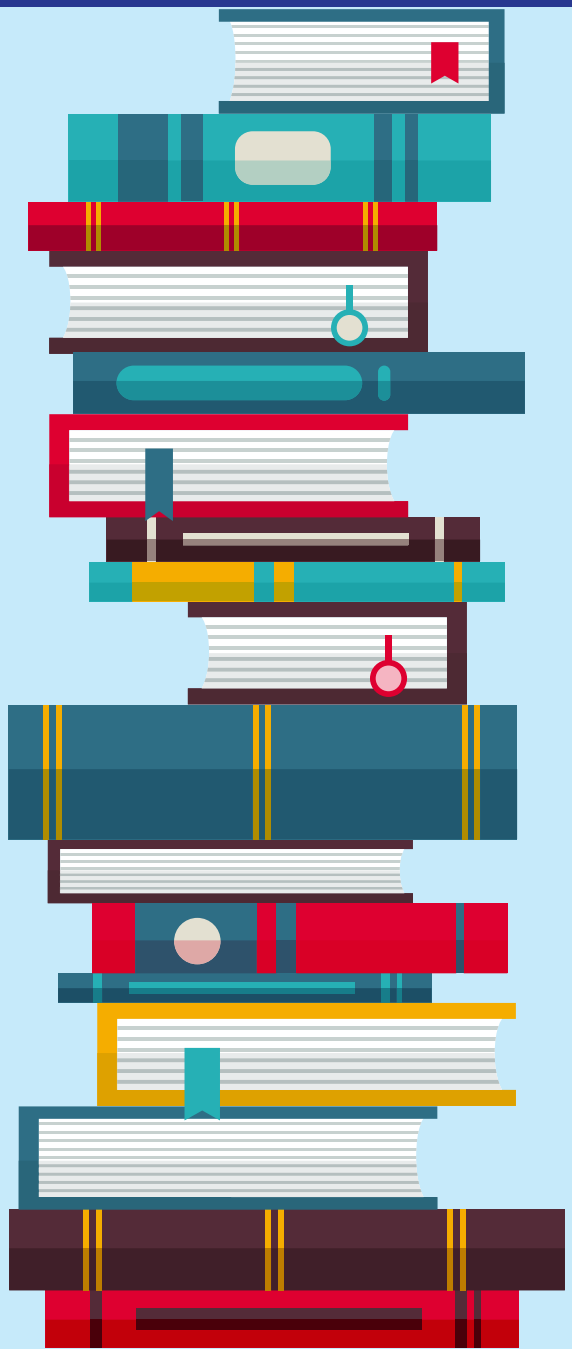
AQUAEXCEL^{2020} Recent Publications

Song, X., Marandel, L., Dupont-Nivet, M., Quillet, E., Geurden, I., Panserat, S. (2018). Hepatic glucose metabolic responses to digestible dietary carbohydrates in two isogenic lines of rainbow trout. *Biol Open. 7*. DOI: **10.1242/bio.032896.**

Maouche, A., Curran, E., Goupil, AS., Sambroni, E., Bellaiche, J., Le Gac, F., (2018). New insights into the evolution, hormonal regulation, and spatiotemporal expression profiles of genes involved in the Gfra1/Gdnf and Kit/Kitlg regulatory pathways in rainbow trout testis. *Fish Physiol Biochem*. DOI: **10.1007/s10695-018-0547-4.**

Marcos-López, M., Calduch-Giner, J.A., Mirimin, L., MacCarthy, E., Rodger, H.D., O'Connor, I., Sitjà-Bobadilla, A., Pérez-Sánchez, J., Piazzon, M.C. (2018). Gene expression analysis of Atlantic salmon gills reveals mucin 5 and interleukin 4/13 as key molecules during amoebic gill disease. *Scientific Reports* 8:13689. DOI: **10.1038/s41598-018-32019-8.**

Please support the promotion of the important activities of the AQUAEXCEL^{2020} project, including the many free training courses and TNA opportunities, by distributing this newsletter among your colleagues, organisations and wider networks.



Contact Us

Coordination: marc.vandeputte@inra.fr
Project Management: philippine.debarbeyrac@inra.fr
Communication & Press: marieke@aquatt.ie

WWW.AQUAEXCEL2020.EU
@AQUAEXCEL2020

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 652831. This output reflects the views only of the author(s), and the European Union cannot be held responsible for any use which may be made of the information contained therein.

Designed & developed by AquaTT